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The simulation and reconstruction studies on LHCb UP detector for Upgrade II

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The LHCb experiment is preparing for its Upgrade II, during which the instantaneous luminosity will increase by at least a factor of five with respect to Run 3, reaching $1.0\times10^{34}cm^{-2}s^{-1}$. The increase in luminosity is very demanding on the detectors. To address these challenges, the current silicon micro-strip Upstream Tracker (UT) will be replaced by a new Upstream Pixel (UP) detector, consisting of four layers of MAPS-based pixel sensors. Located upstream of the dipole magnet, the UP detector is a crucial component of the LHCb tracking system. It provides fast momentum estimates for the trigger system and is essential for reconstructing long-lived particles. This talk will present detailed simulation and reconstruction studies of the UP detector, including investigations of new detector geometries, hit rate, tracking efficiency, ghost rate, and momentum resolution under Upgrade II conditions.

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